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ABSTRACT

The present study compared the relative effectiveness of three home visiting projects whose purpose was to train low income mothers to use commonly available materials and everyday events for the educational stimulation of their preschool children. The home visiting projects varied in terms of expense and professional qualifications of the home visitors. Data on general intelligence, concept development and maternal teaching style were analyzed to determine the effect of home visits on the child and mother and to compare treatment effects associated with each of the projects. In addition to the Stanford Binet and Peabody Picture Vocabulary Test used to test children's aptitude, two relatively new instruments were used: the DARCEE Concept Test for Children, and an abridged version of the Maternal Teaching Style Instrument. Results of testing showed little difference between treatment groups and suggest a useful plan for involving paraprofessionals in a meaningful "career ladder" which results in an educational intervention project staffed entirely by paraprofessionals. (NH)

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FINAL REPORT

Educational Intervention in the Home and Paraprofessional Career Development: A Second Generation Mother Study with an Emphasis on Costs and Benefits

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INTRODUCTION

The plan of the present study was to utilize the educational potential of low income mothers. The strategy involved the use of home visitors to train mothers to be effective educational change agents for their children.

Home visiting has become an increasingly popular form of intervention in compensatory education (Gray & Klaus, 1965; Weikart, 1967; Gordon, 1969; Barbrack, 1970; Barbrack & Horton, 1970). There appear to be several reasons for this popularity. First of all, home visiting by its very definition has the potential for changing parental behavior toward children. The parent, in turn, has the potential of acting as a powerful force not only in providing education stimulation for the child, but also in sustaining the effects of educational intervention. Thus, home visiting has been viewed as a method of averting the dissolution of treatment effects over time (Barbrack, 1970). Since it costs only a fraction of a formal classroom program, the popularity of home visiting can also be attributed to its relative inexpensiveness. In a related vein, the costs per child are even less in view of what some authors (Gray & Klaus, 1965; Gilmer, 1969) have termed the "vertical diffusion" phenomenon. "Vertical diffusion" refers to the spread to treatment effects from target children to the siblings of target children. Changing parental behavior has the potential of influencing more than one child in a family and thus reduces the cost of intervention even further.

The home visiting approach used at DARCEE embodies an attempt to upgrade the educability of low income children by working with and through the mothers. By means of weekly visits to the target homes, an attempt is made to teach mothers

to use materials found in the home and events that arise during household routines for the educational stimulation of their children. Commercial materials are used, but are used infrequently.

There is ample empirical evidence to support this mode of intervention. Hess (undated manuscript) found high positive correlations between measures of children's reading readiness scores and certain characteristics of the mothers' teaching style. These characteristics included providing a model for the child to imitate, orienting the child to a task, and providing specific feedback. In a doctoral dissertation Wiegerink (1969) described a study in which four material variables were measured and correlated to the child's measured aptitude. These factors were: maternal teaching style, mother's socio-economic status, mother's personality rating and mother's language. Results of a stepwise correlation indicated that maternal teaching style accounted for more variance (27 percent) in the child's Binet IQ than any of the other maternal factors. Barbrack and Gilmer (in preparation) have reported high positive correlations between maternal teaching style and children's WPPSI scores.

The effectiveness of the home visiting strategy has been demonstrated in several studies which were designed to upgrade the child's academic aptitude and school readiness by modifying parental behavior (Gordon, 1969; Gilmer, 1969; Barbrack, 1970; Barbrack & Horton, 1970).

The present study was based on the idea that changes in the manner and extent that a mother interacts with her child should be reflected in improvements in the child's academic aptitude.

Shrinking funds, interest in cost/benefit analysis and the resolve to involve paraprofessionals in the implementation of education programs has made it

imperative that organizations, such as DARCEE, test the feasibility and relative effectiveness of paraprofessional "career ladders." As a result, in addition to investigating the effectiveness of home visiting as an educational intervention, the present study was designed to contrast the relative effectiveness of home visiting projects which varied in terms of expense and professional qualifications of the home visitors.

The plan for the present study involved comparisons between three DARCEE home visiting projects. In the first project a group of families was visited by a professionally trained teacher. In the second, a group of families was visited by paraprofessional home visitors who were trained and supervised by a professionally trained teacher. This group was designated Mothers in Training I (MIT I). Families in the third group were visited by paraprofessional home visitors who were supervised by other paraprofessionals. The paraprofessional supervisors were experienced home visitors. This group was designated Mothers in Training II (MIT II).

HYPOTHESIS

Hypothesis 1 — that there are no differences between Treatment groups on the pretest and posttest of the Stanford Binet, Peabody Picture Vocabulary Test and the DARCEE Concept Test for Children.

Hypothesis 2 — that scores on the Stanford Binet, Peabody Picture Vocabulary Test and DARCEE Concept Test for Children will increase from pretest to posttest for Mothers in Training I (MIT I) and Mothers in Training II (MIT II).

Hypothesis 3 — that the Treatment groups scores are higher than Comparison group scores on the posttest of the Stanford Binet, Peabody Picture Vocabulary Test and the DARCEE Concept Test for Children.

Hypothesis 4 — that there are no differences between Mothers in Training I (MIT I) and Mothers in Training II (MIT II) on the pretest and posttest categories of the Maternal Teaching Style Instrument.

Hypothesis 5 — that Cue Label, Positive Feedback, Question, Information, $\frac{\text{Positive Feedback}}{\text{Direction}}$, $\frac{\text{Total Feedback}}{\text{Direction}}$ for MIT I and MIT II mothers increase from pretest to posttest of the Maternal Teaching Style Instrument.

Hypothesis 6 — that Negative Feedback and $\frac{\text{Negative Feedback}}{\text{Direction}}$ responses for MIT I and MIT II mothers decrease from pretest to posttest of the Maternal Teaching Style Instrument.

In testing for differences between Treatment groups the alpha level was set at .05. In statistical comparisons between the Treatment and Comparison groups the accepted alpha level was .10. The argument for inflating alpha to .10, and taking a greater risk of making a Type I error, rejecting a true null hypothesis, was based on the same logic used by the authors in a recent paper on home visiting (Barbrack & Horton, 1970). The argument is that the increased risk of a Type I error was more than justified in view of the value of the career ladder which was built into the study, as well as the relative inexpensiveness of the home visiting strategy. A Type II error, accepting a false null hypothesis, was seen as far more detrimental than a Type I error.

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METHODOLOGY

Subjects

Ten preschool children and their families were recruited for the present study. There were seven girls and three boys, and all were Black. At the time of post-testing the children ranged in age from 46 to 64 months. The mean chronological age for the group was 54.40 months. This group was designated Mothers in Training II (MIT II). The average age of the mothers in this group was 28 years. Fifty-nine percent of the homes were father absent and 41 percent of the families were receiving public assistance. The average number of children per home was 6.40.

Test data on children from two previous DARCEE home visitor projects were also included in this study for comparison purposes. The first group of children was a target population for home visits in a project begun by DARCEE in 1966 (Gilmer, Gray & Miller, in preparation). The 17 children employed were the younger siblings of the target children in the 1966 study. There were 10 boys and seven girls. All of the children were Black. At posttesting these children ranged in age from 53 to 75 months. The mean chronological age for the group was 61.00 months. The average age of mothers in this group was 28 years. Sixty-four percent of the homes were father absent and 54 percent were receiving public assistance. The average number of children per home was 3.54.

The second group of 12 children participated in a home visitor study begun by DARCEE in 1968 (Barbrack & Horton, 1970). Again, all of the children were Black and ranged in age from 47 to 64 months with a mean chronological age of 51.42 months. The group was comprised of eight girls and four boys and

was designated Mothers in Training I (MIT I). The average age of mothers in this group was 30 years. Sixty percent of the homes were father absent and 40 percent

Table I

Mean Chronological Ages at Posttest of Home Visitor Treatment Groups and Comparison Group

	Group	N	Chronological Age (months)
T1	Vertical Diffusion - Younger Sibs	17	61.00
T2	MIT I	12	51.42
T3	MIT II	10	54.40
T4	Comparison	10	54.70

were receiving public assistance. The average number of children per home was 3.50.

A comparison group was selected at the end of the present study. This group of 10 Black children ranged in age from 46 to 64 months with a mean chronological age of 54.70 months. There were seven girls and four boys. The average age of the mothers in this group was 27 years. Forty percent of the homes were father absent and 40 percent were receiving public assistance. The average number of children per home was 4.50.

All families employed in this study were drawn from the same low income housing project in Nashville, Tennessee.

Treatments

The present study was designed to examine the effectiveness of home visiting as an intervention strategy in compensatory early education. Furthermore, from the standpoint of cost/benefit analysis, the study represents an attempt at contrasting the effectiveness of three home visiting projects each of which varied in terms of the expense involved.

The goals of each of the home visiting projects were the same. In each instance an attempt was made to enhance the educability of the child by working with and through the mother in the home. This procedure is described in greater detail elsewhere (Barbrack, 1970; Barbrack & Horton, 1970; Giesy, et.al., in preparation).

The study from which TI was drawn ran for approximately 18 months and was staffed by a professionally trained and experienced teacher. During the first nine months of this study the children in TI were not target children, but younger siblings of target children. However, they were present during the visits and were involved in the mothers' training activities in almost every instance. In fact, an important feature of this intervention, as well as those that followed, was training the mother to scale activities up and down to meet the needs of her other children who were either older or younger than the target child. Testing of these younger siblings took place at the beginning and again at the end of the second nine months of intervention. During this period many of the target children began public school and were replaced as target children by their younger siblings. In effect, all children in TI were younger siblings of target children and were indirectly exposed to the home visitor intervention for nine months prior to

pretesting. During the time elapsed between pretesting and posttesting, 13 of this group became target children, and four maintained the younger sibling status.

The full time salary of the professional teacher made this DARCEE's most expensive home visiting project. The cost per child for the implementation of a full year program of this nature would be approximately $440. It should be noted however, that this form of intervention is still far less expensive than a formal classroom program.

Families in T2 were visited by home visitors who did not have previous teaching experience. These four mothers were involved in an earlier DARCEE project in which they participated in the preschool classroom and received home visits. One of these women was a high school graduate; the others were not. A professionally trained teacher, experienced in home visiting, trained and supervised these paraprofessional home visitors. Because the professional staff member was involved on only a part time basis and the paraprofessionals were paid at a lower rate than professionals, this intervention was less expensive than the first. Implementation of the program for one year would cost approximately $300 per child. At the end of this study, four of the treatment group mothers were selected and trained to act as home visitors in the next home visiting project.

Families in T3 were visited by these four treatment group mothers. The four were trained and supervised by the home visitors from the previous study. The efforts of the home visitor supervisors were guided and supervised by a professional teacher who was experienced in implementing home visits and training home visitors. With paraprofessional home visitors and paraprofessional trainer-supervisors, and only periodic

consultation from the professional staff, this was DARCEE's least expensive approach to home visiting. The implementation cost of this study on a yearly basis would be approximately $275 per child.

Data

Since the comparisons between all of these treatments were not planned at the outset of DARCEE's first home visitor intervention, it has been difficult, and in some cases impossible, to retrieve pretest and posttest scores for all groups on all measures. Available test data are presented in Table 2. In all cases the period between pre-testing and posttesting was approximately 10 months.

Table 2

Available Pretest and Posttest Data for Home Visitor Treatment Groups and Comparison Group

Measure	Group							
	T1 Vertical Diffusion Younger Sibs		T2 MIT I		T3 MIT II		T4 Comparison	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Stanford Binet	X	X	X	X	X	X		X
Peabody Picture Vocabulary Test	X	X	X	X	X	X		X
DARCEE Concept Test		X	X	X	X	X		X
Maternal Teaching Style			X	X	X	X		

An additional problem arose because TI children were older than children in the other three groups. Table 3 presents the results of an analysis of variance between groups on the chronological age variable. Further analysis using a Newman-

Table 3

Comparison of Chronological Ages of Home Visitor Treatment Groups and Comparison Group

Source	df	MS	F	p
Between Groups	3	239.85	7.048	<.001
Within Groups	45	34.04		
Total	48	46.90		

Keuls procedure indicated that TI children were significantly older than the others, but that there was no significant difference between the remaining groups. It appeared that this age difference would be most damaging in the analysis of the DARCEE Concept Test data, since performance on this particular test is clearly related to the child's age. As a result, when pretest scores were unavailable chronological age was used as a covariate in the analyses of scores on theDARCEE Concept Test.

Instrumentation

In addition to the Stanford Binet and Peabody Picture Vocabulary Test, two relatively new instruments were employed. The DARCEE Concept Test for Children (Gilmer, 1969) was used to measure the child's ability to use a variety of important concepts. The test is divided into three subtests. On the Matching subtest, the

child is required to match cards, each displaying a colored geometric form, to a stimulus card displaying several geometric forms. On the Recognition subtest, the child is presented with several different stimulus display cards and required to point to the color, shape, etc. stated by the examiner. On the Identification subtest, the child must name the various colors, shapes, etc. that are presented by the examiner.

An abridged version of the Maternal Teaching Style Instrument (Barbrack, 1970) was employed to measure the mother's teaching behavior. This instrument is designed to create a situation in which the mother is required to help her child successfully complete a series of tasks. The abridged version of the MTSI consists of four display cards. Mother and child are given separate cards. On the mother's card there are pictures of three geometric forms. Accompanying each card there are three rubber forms which correspond to those shown on the mother's card. The child's card is either blank or contains colored pictures of geometric shapes. The child must place the rubber forms on or around the shapes shown on his card. The mother's objective is to help the child to make his card look like her card. The card designs and directions for administration for the task are presented in Appendix A. In this particular study only the mother's verbal responses were tape recorded and later rated. The mother's verbalizations were rated in terms of: Cue Label, Positive Feedback, Negative Feedback, Direction, Questioning and Information (See Appendix B for category definitions and unitization rules). The proportion of positive feedback to directions, negative feedback to directions, and total feedback to directions, were also calculated.

The mothers' verbalizations were tape recorded and later rated by two graduate students. Both were experienced in rating MTSI responses and had participated in more than 40 hours of training for rating work in previous studies. Both raters rated each tape independently. Discrepant ratings were not included in the data analyses. Rater discrepancies accounted for the deletion of less than 10 percent of all responses rated.

RESULTS

Data on general intelligence, concept development and maternal teaching style were analyzed to determine the effect of home visits on the child and mother and to compare treatment effects associated with each of the home visitor projects.

Table 4 presents pretest and posttest Treatment group means and standard deviations on the Binet and the posttest mean and standard deviation for the Comparison group. T1 and T2 scores reflected slight declines from pretest to

Table 4

Pretest and Posttest Stanford Binet Mean IQ Scores and Standard Deviations for Home Visitor Treatment Groups and Posttest Mean IQ and Standard Deviation for Comparison Groups

Group	Mean		Standard Deviation	
	Pre	Post	Pre	Post
T1	96.23	94.41	13.72	11.68
T2	91.25	90.66	15.33	13.59
T3	90.30	90.60	14.82	17.60
T4		82.90		9.72

posttest while T3 gained +.30.

As shown in Table A (Appendix C), results of a Lindquist Type I analysis of variance (Lindquist, 1953) of Binet pretest and posttest scores of the three Home Visitor groups indicated no significant difference between trials or groups.

Table B (Appendix C) presents the results of an analysis of variance of Binet posttest scores for the Home Visitor groups and comparison group. No significant between group differences were indicated.

Table 5

Pretest and Posttest Peabody Picture Vocabulary Test Mean IQ Scores and Standard Deviations for Home Visitor Treatment Groups and Posttest Mean IQ and Standard Deviation for Comparison Group

Group	Mean		Standard Deviation	
	Pre	Post	Pre	Post
T1	70.41	65.70	15.74	22.80
T2	65.33	62.58	19.40	23.57
T3	68.90	80.20	15.67	20.89
T4		55.60		16.38

Table 5 shows pretest and posttest Treatment group means and standard deviations on the Peabody Picture Vocabulary Test and for the Comparison group. Again, T1 and T2 scores declined from pretest to posttest, while T3 gained +11.30.

The analysis of PPVT scores for the Treatment groups taken alone, (Table C) from pretest to posttest, indicated no significant differences between trials or groups (Appendix C). In view of the relatively large gain reflected in the PPVT scores of T3, an analysis of PPVT posttest scores for the Home Visitor groups and Comparison group was performed. The results of this analysis are presented in Table 6 and indicate a significant difference between groups ($F = 2.388$, $p < .10$).

Table 6

Summary of Analysis of Variance Between Peabody Picture Vocabulary Test Posttest Scores of Home Visitor Treatment Groups and Comparison Group

Source	df	MS	F	p
Between Groups	3	1079.42	2.338	< .10
Within Groups	45	461.65		
Total	48			

Further analysis using a Newman-Keuls procedure (Winer, 1962) indicated T3 scores to be significantly higher ($p < .05$) than T4 scores (Table 7).

Table 7

Newman-Keuls Sequential Comparison Between Mean Scores of Home Visitor Treatment Groups and Comparison Groups on Peabody Picture Vocabulary Test

Order	4	2	1	3
Group	Comparison	MIT I	Vertical Diffusion Home Visitor	MIT II
Mean	55.60	62.58	65.70	80.20
4		6.98	10.10	24.60*
2			3.12	17.62
1				14.50
3				
	r	2	3	4
*.95, $r\sqrt{MS\ error/\tilde{n}}$		17.56	21.12	23.27

Table 8 presents pretest and posttest means and standard deviations on the DARCEE Concept Test for T2 and T3. As shown in Table 9, the results of an analysis of variance between groups from pretest to posttest on the Matching subtest indicated that both groups gained significantly ($F = 66.15$, $p < .0001$) from pretest to posttest. The data presented in Table 10 indicated that both groups also improved significantly ($F = 104.91$, $p < .0001$) on the Recognition subtest from pretest to posttest.

Table 8

Pretest and Posttest Means and Standard Deviations on Matching, Recognition and Identification Subtest of the DARCEE Concept Test for Children for MIT I and MIT II

Subtest	Trial	Mean		Standard Deviation	
		MIT I	MIT II	MIT I	MIT II
Matching	Pretest	24.25	31.30	12.47	10.33
	Posttest	42.83	46.50	4.34	5.16
Recognition	Pretest	5.26	5.90	3.19	4.97
	Posttest	12.75	15.00	4.07	3.23
Identification	Pretest	2.92	1.90	2.96	2.80
	Posttest	9.83	12.30	5.57	3.91

Table 9

Summary of Lindquist Type I Analysis of Variance Between Matching Pretest and Posttest Scores of MIT I and MIT II

Source	df	MS	F	p
Between	21	120.71		
Groups	1	349.27	3.20	.08
Error (G)	20	109.28		
Within	22	185.16		
Trials	1	3094.57	66.15	<.0001
G X T	1	43.27	.92	ns
Error (T)	20	46.78		
Total	43	153.68		

Table 10

Summary of Lindquist Type I Analysis of Variance Between Recognition Pretest and Posttest Scores of MIT I and MIT II

Source	df	MS	F	p
Between	21	23.45		
Groups	1	22.94	.98	ns
Error (G)	20	23.47		
Within	22	40.61		
Trials	1	744.57	104.91	<.0001
G X T	1	6.98	.98	ns
Error (T)	20	7.10		
Total	43	32.23		

The analysis of Identification scores (Table II) revealed a significant G X T interaction ($F = 4.31$, $p < .05$). A series of t Tests for simple effects indicated no significant differences between groups on the pretest ($t = .82$) or the post-test ($t = -1.18$), but that improvement from pretest to posttest was significant for T2 ($t = 6.15$, $p < .001$) and T3 ($t = 8.33$, $p < .0001$).

Table II

Summary of Lindquist Type I Analysis of Variance Between Identification Pretest and Posttest Scores of MIT I and MIT II

Source	df	MS	F	p
Between	21	23.79		
Groups	1	5.73	.23	ns
Error (G)	20	24.70		
Within	22	44.61		
Trials	1	794.75	103.44	<.0001
G X T	1	33.09	4.31	< .05
Error (T)	20	7.68		
Total	43	34.44		

Analysis of posttest scores on the DARCEE Concept Test included the Home Visitor groups and the Comparison group. An analysis of covariance procedure was employed using the child's chronological age as a covariate. Adjusted posttest mean scores for each of the subtests are presented in Table 12.

Table 12

Adjusted Posttest Mean Scores for Home Visitor Treatment Groups and Comparison Group on Matching, Recognition, and Identification Subtests of DARCEE Concept Test for Children

	Matching	Recognition	Identification
T1	44.32	14.89	11.87
T2	44.00	13.49	10.87
T3	46.91	15.26	12.66
T4	41.13	9.11	3.49

The results of the analysis of covariance of Matching scores shown in Table 13 revealed a significant between group difference ($F = 2.19$, $p < .10$). Further analysis (Table 14) of these data indicated that T3 Matching scores were significantly superior ($p < .05$) to T4 Matching scores.

Table 13

Summary of Analysis of Covariance Using Child's Chronological Age as Covariate Groups and Comparison Group Posttest Scores on Matching Subtest of the DARCEE Concept Test for Children

Source	df	MS	F	p
Between Groups	3	55.90	2.19	< .10
Within Groups	44	25.52		
Total	47			

Table 14

Newman-Keuls Sequential Comparison Between Adjusted Group Means of Home Visitor Treatment Groups and Comparison Groups on Matching Subtest of DARCEE Concept Test for Children

Order	4	2	1	3
Group	Comparison	MIT I	Vertical Diffusion Home Visitor	MIT II
Mean (Adjusted)	41.13	44.00	44.32	46.91
4		2.87	3.19	5.78*
2			.32	2.91
1				2.59
3				

r	2	3	4
*.95, $r\sqrt{MS\ error/\ n}$	4.12	4.95	5.46

Analysis of posttest Recognition scores is shown in Table 15 and indicated a significant between group difference ($F = 9.568$, $p < .0001$). Further analysis (Table 16) revealed that all of the Home Visitor groups were significantly superior ($p < .05$) to the Comparison group.

Analysis of posttest Identification scores is presented in Table 17 and again indicated a significant between group difference ($F = 10.522$, $p < .0001$). Further analysis of these data, presented in Table 18, indicated that the three Home Visitor groups were significantly superior ($p < .05$) to the Comparison group.

Table 15

Summary of Analysis of Covariance Using Child's Chronological Age as Covariate Between Home Visitor Treatment Groups and Comparison Group Posttest Scores on Recognition Subtest of DARCEE Concept Test for Children

Source	df	MS	F	p
Between Groups	3	82.24	9.568	<.0001
Within Groups	44	8.59		
Total	47			

Table 16

Newman-Keuls Sequential Comparison Between Adjusted Group Means of Home Visitor Treatment Groups and Comparison Groups on Recognition Subtest of DARCEE Concept Test for Children

Order	4	2	1	3
Group	Comparison	TOMIT I	Vertical Diffusion Home Visitor	TOMIT II
Mean (Adjusted)	9.11	13.49	14.89	15.26
4		4.38*	5.78*	6.15*
2			.14	1.77
1				.37
3				
	r	2	3	4
*.95, $r\sqrt{MS\ error/\tilde{n}}$		2.40	2.88	3.18

Table 17

Summary of Analysis of Covariance Using Child's Chronological Age as Covariate Between Home Visitor Treatment Groups and Comparison Group Posttest Scores on Identification Subtest of DARCEE Concept Test of Children

Source	df	MS	F	p
Between Groups	3	184.02	10.522	<.0001
Within Groups	44	17.48		
Total	47			

Table 18

Newman-Keuls Sequential Comparison Between Adjusted Group Means of Home Visitor Treatment Groups and Comparison Group on Identification Subtest of DARCEE Concept Test for Children

Order	4	2	1	3
Group	Comparison	MIT I	Vertical Diffusion Home Visitor	MIT II
Mean (Adjusted)	3.49	10.87	11.87	12.66
4		7.38*	8.48*	9.17*
2			1.00	9.79
1				.79
3				
	r	2	3	4
*.95, $r\sqrt{MS\ error/\tilde{n}}$		3.43	4.13	4.55

Table 19 shows pretest and posttest means and standard deviations on the Maternal Teaching Style Instrument for T2 and T3.

Table 19

Pretest and Posttest Means and Standard Deviations on Categories of Maternal Teaching Style Instrument for MIT I and MIT II

Category	Trial	Mean		Standard Deviation	
		MIT I	MIT II	MIT I	MIT II
Cue Label	Pretest	12.83	10.00	8.82	4.81
	Posttest	23.33	18.80	4.15	3.39
Positive Feedback	Pretest	4.83	5.70	2.41	4.21
	Posttest	5.25	6.00	2.58	3.39
Negative Feedback	Pretest	6.92	7.60	5.38	11.75
	Posttest	1.67	4.30	2.25	6.20
Question	Pretest	.92	1.80	1.73	3.37
	Posttest	3.08	2.70	7.94	2.87
Information	Pretest	.33	.30	.89	.48
	Posttest	.75	.60	1.05	.42
Positive Feedback Direction	Pretest	.25	.21	.18	.13
	Posttest	.40	.58	.34	.23
Negative Feedback Direction	Pretest	.41	.18	.30	.14
	Posttest	.11	.40	.20	.36
Total Feedback Direction	Pretest	.66	.39	.41	.14
	Posttest	.52	.99	.38	.46

A series of Lindquist Type I analyses of variance were performed between groups on the pretest and posttest. The results presented in Table 20 indicate that Cue Label responses increased significantly from pretest to posttest

Table 20

Summary of Lindquist Type I Analysis of Variance Between Cue Label Pretest and Posttest Scores on Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	89.34		
Groups	1	141.38	1.63	ns
Error (G)	20	86.74		
Within	22	67.54		
Trials	1	1021.46	44.59	< .0001
G X T	1	6.41	.28	ns
Error (T)	20	22.91		
Total	43	78.19		

($F = 44.59$, $p < .0001$). While there was not significant change in the mothers' Positive Feedback responses (Table D, Appendix C), mothers' Negative Feedback responses (Table 21) in both groups declined significantly ($F = 5.15$, $p < .05$) from pretest to posttest. The results presented in Tables E and F (Appendix C) indicated no significant difference between groups or trials on the Question and Information categories. Analysis of the proportion of Positive Feedback to Direction responses (Table 22) indicated a significant increase from pretest to posttest

Table 21

Summary of Lindquist Type I Analysis of Variance Between Negative Feedback Pretest and Posttest Scores on Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	47.09		
Groups	1	30.00	.62	ns
Error (G)	20	47.94		
Within	22	46.95		
Trials	1	209.45	5.15	< .05
G X T	1	10.37	.26	ns
Error (T)	20	40.66		
Total	43	47.02		

Table 22

Summary of Lindquist Type I Analysis of Variance Between Proportion of Positive Feedback to Direction on Pretest and Posttest of Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	.05		
Groups	1	.05	.86	ns
Error (G)	20	.05		
Within	22	.10		
Trials	1	.71	11.29	< .01
G.X T	1	.14	2.21	ns
Error (T)	20	.06		
Total	43	.08		

($F = 11.29$, $p < .01$). Table 23 shows the results of an analysis of variance between groups on the pretest and posttest proportion of Negative Feedback to Direction responses. This analysis revealed a significant G X T interaction ($F = 11.41$, $p < .01$). A series of t Tests for simple effects indicated that T2 mothers verbalized a significantly greater proportion of Negative Feedback responses on the pretest ($t = 2.17$, $p < .05$). This situation was reversed on the

Table 23

Summary of Lindquist Type I Analysis of Variance Between Proportion of Negative Feedback to Direction on Pretest and Posttest of Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	.08		
Groups	1	.01	.45	ns
Error (G)	20	.08		
Within	22	.09		
Trials	1	.04	.63	ns
G X T	1	.71	11.41	< .01
Error (T)	20	.06		
Total	43	.08		

posttest where T3 mothers emitted a higher proportion of Negative Feedback responses ($t = -2.33$, $p < .05$). The proportion of Negative Feedback responses for T2 mothers was 41 percent on the pretest and 11 percent on the posttest. This decrease was statistically significant ($t = 2.73$, $p < .05$). The proportion

of Negative Feedback responses for T3 mothers was 18 percent on the pretest and 40 percent on the posttest. This increase was not statistically significant ($t = 2.09$). Analysis of the proportion of all feedback responses to Direction responses (Table 24) resulted in a significant G X T interaction ($F = 9.92$, $p < .01$). Subsequent analyses for simple effects revealed no significant differences between groups on

Table 24

Summary of Lindquist Type I Analysis of Variance Between Proportion of Total Feedback to Direction on Pretest and Posttest of Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	.13		
Groups	1	.11	.79	ns
Error (G)	20	.13		
Within	22	.22		
Trials	1	.42	2.77	ns
G X T	1	1.49	9.92	<.01
Error (T)	20	.15		
Total	43	.18		

the pretest ($t = 1.95$), but showed that T3 mothers' emitted a significantly greater proportion of feedback responses on the posttest ($t = -2.58$, $p < .05$). The proportion of feedback responses for T2 mothers was 60 percent on the pretest and 52 percent on the posttest. This decrease was not significant ($t = .80$). The proportion of feedback responses for T3 mothers was 38 percent on the pretest and 98 percent on the posttest. This increase was significant ($t = 4.17$, $p < .01$).

DISCUSSION

Before embarking on a discussion of the results of this study, a point about the treatments must be clarified. In part this study was designed to contrast the effects of three home visiting projects. Each of the projects was closely related to the others in terms of treatment objectives, implementation procedures, materials employed, amount of treatment, time elapsed between pretesting and posttesting, and race, socioeconomic status and geographical location of the treatment families. Ostensibly, the projects differed only with respect to the home visitors' professional qualifications. If this were the case, obtained differences between treatment groups could be associated with the previous training, skills, attitudes and other personal qualities of the home visitors responsible for the implementation of each project. However, DARCEE's approach to home visiting has changed over the years since 1966. Accrued experiences, successes and failures, have led to periodic refinements, elaborations, and clarifications of the home visiting strategy. While it is a matter of conjecture, it seems reasonable to assume that the DARCEE home visiting approach has improved as a result of this experience. In effect, the home visiting treatments, beyond the level of personnel employed, have changed from year to year. Thus the relationship between treatment effects and level of personnel employed is confounded to the extent that treatment modifications have influenced the results obtained. The results must therefore be related not only to the level of personnel, but also to the DARCEE home visitor program at a particular point in its development.

Analyses of the posttest scores on two of the three aptitude measures indicated the presence of a treatment effect. This was particularly true for DARCEE Concept

Test scores. The Treatment groups were superior to the Comparison group on the Recognition and Identification subtests, and T3 was superior to the Comparison group on the Matching subtest. In addition, each of the Treatment groups gained significantly from pretest to posttest on all of the DARCEE Concept subtests. These differences were only marginally reflected in the Binet and PPVT scores. The Treatment groups' Binet scores were substantially higher than those of the Comparison group, but this superiority was not statistically significant. Similiarly, on the PPVT the Treatment groups' scores were higher, but only in the case of T3 was the superiority statistically significant. None of the Treatment groups gained significantly from pretest to posttest on the Binet or PPVT.

The DARCEE Concept Test for Children was developed to measure concepts which are important to early learning as well as to later school success. Furthermore, it was designed to closely reflect some of the basic skills specified in the DARCEE curriculum. Lastly, it was intended to meet the evaluation needs created by the relative insensitivity of the Binet, PPVT, and other standard psychometric measures to the effects of compensatory preschool intervention programs. The DARCEE Concept Test results obtained in this study not only tended to confirm the presence of significant treatment effects, but in doing so also pointed out that the test fulfilled the objectives which guided its creation.

Use of a posttest analysis alone assumes that at pretesting the groups would score at approximately the same level on the instruments employed. Where pretest data were available, this assumption was confirmed. This point is particularly important with respect to the data from the DARCEE Concept Test. Since no pretest data were available for the Comparison group, the most parsimonious explanation of the

posttest superiority of the Treatment groups is that the groups were initially different. On the other hand, it appears unlikely that all three of the Treatment groups would be initially superior to the Comparison group. Yet the three Treatment groups were superior to the Comparison group at termination of each project. The uniformity of these findings tends to further support the presence of a treatment effect.

If it is valid to contend that all of the groups were functioning on about the same level before treatment, the data also suggest an interesting interpretation of the effect of home visiting on academic aptitude as measured by the Binet and PPVT. The results of this study indicate that home visiting tends to stem the relative decline or so called "progressive retardation" which characterizes the rate of academic aptitude development of many low income children. In effect, the home visitor activities seem to have helped the mother to help her child keep pace with increasing cognitive demands. It may well be that stemming the rate of decline without an inflationary effect on measured aptitude will result in a stabilization of treatment effects over time, instead of the "wash out" of treatment effects which has routinely followed compensatory preschool interventions. Training and involvement of the mother, a natural sustaining agent, may tend to fortify this stability.

The home visiting programs also seem to have resulted in significant changes in the mothers' manner of teaching their children. The Maternal Teaching Style Instrument data indicate that the mothers became more specific, more positive and less negative in teaching their children. Failure to obtain differences on the Question and Information categories was probably due more to the nature of the task, which did not lend itself to this particular style, than to the mothers' abil-

to ask questions and give information. Several recent studies (Hess, et.al., 1958; Wiegerink & Weikart, 1968; Wiegerink, 1969; Barbrack & Gilmer, in preparation) have reported significant correlations between children's measured aptitude and mothers' tendencies to be specific and in their use of positive and negative feedback in dealing with their children. In view of these findings, the data presented in this study indicate that the home visitors were successful in helping mothers become more effective educational change agents for their children.

Inspection of the data reveals very little to distinguish between Treatment groups. Results of the PPVT, the Matching subtest and the $\frac{\text{Total Feedback}}{\text{Direction}}$ category of the Maternal Teaching Style Instrument indicate that T3 was the most effective treatment. This finding was unexpected from the standpoint that T3 was staffed entirely by paraprofessionals. On the other hand, the premise that paraprofessionals are better at relating to and dealing with low income people, together with the fact that this project was the most recent and presumably the best that DARCEE had offered tend to explain and support this superiority. In any case, none of the other groups was superior to T3 and since T3 was the least expensive project to implement, it appears from a cost/benefit vantage point to have been the most effective.

These findings must be interpreted cautiously but may suggest a useful plan for involving paraprofessionals in a meaningful "career ladder" which results in an educational intervention project staffed entirely by paraprofessionals. Following the DARCEE pattern, a program could begin with trained professionals. Professional skills would, in the course of experience, enable the development of an articulate knowledge base, including materials and procedures, for the intervention program. Next paraprofessionals would be trained and closely supervised over

a year's experience in implementing the project. Thus information on training, more careful specification of program objectives, and more effective procedures and materials would be added to the knowledge base. Finally, paraprofessionals could move up to supervisory positions. Experience in this last phase would generate much needed knowledge about peripheral, brief and periodic supervision of a completely paraprofessional project by a professional organization. Over a five year period the average yearly cost per child for a home visitor program of this type would be less than $325. A cadre of trained and experienced paraprofessionals would be an additional benefit at no extra cost.

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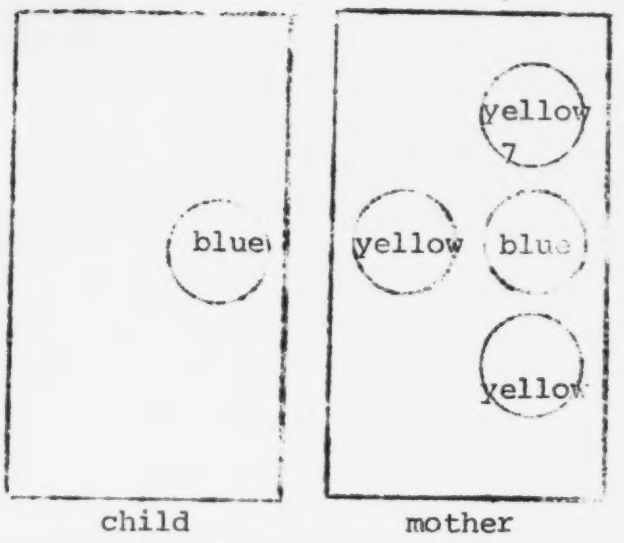
Appendix A

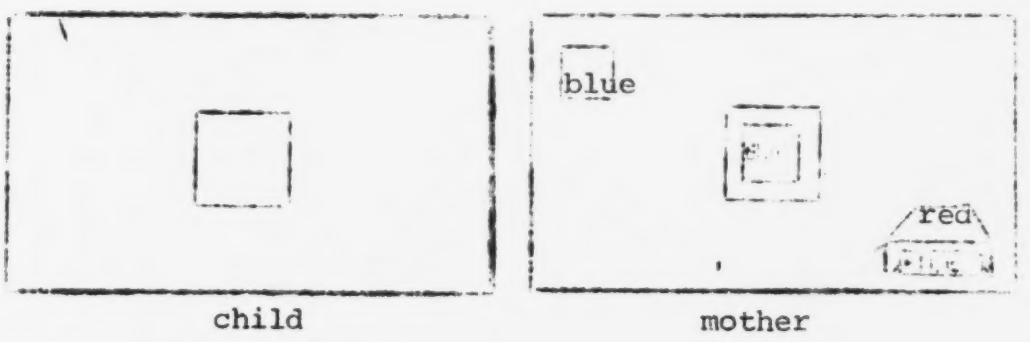
Maternal Teaching Style Instrument

Card Designs and Directions for Administration

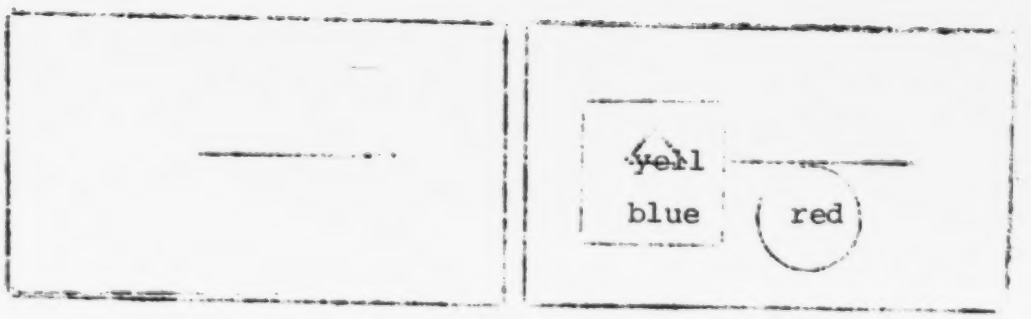
Card 1



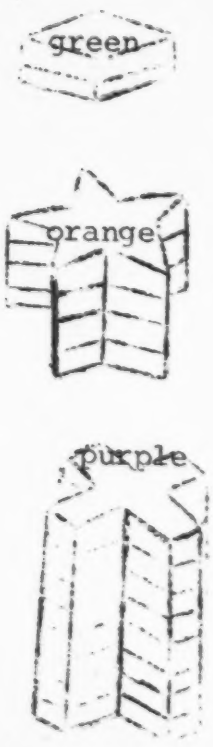
Card 2

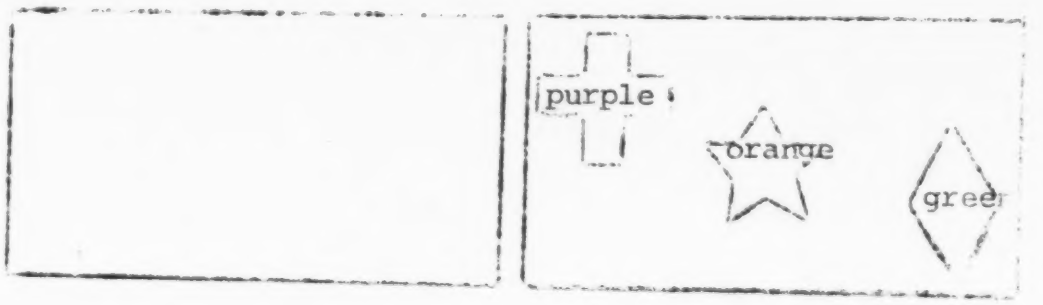


Card 3



Card 4



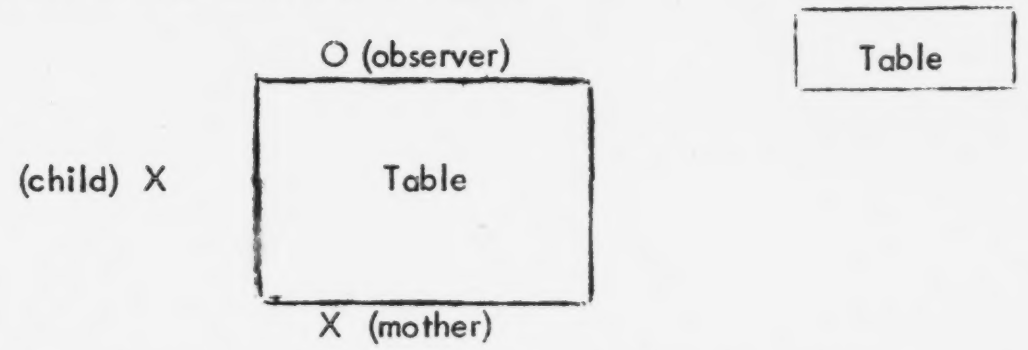


MATERNAL TEACHING STYLE INSTRUMENT (MTSI)
(Abridged Version)

Directions for Administration

1. Arrange all cards and corresponding figures on table at Observer's left.

2. Seat mother and child at other table.



3. Give Card #IM to mother and place Card #IC on the table in front of the child. Place rubber forms corresponding to Card #I in a random order next to child's card.

4. Next say:

   This is a matching game. I want (child's name) to put each figure that is in front of him (her) on the card in the right place. Try to get him (her) to place the figure so that his (her) card looks just like yours. I want you to help (child's name) play the game well. You may help (child's name) in any way, for example, you might tell him (her) where to place a figure. Be sure not to let (child's name) see your card. (To the child) (child's name) I do not want you to do anything until mommy tells you to do it. (To Mother) Please do not begin on any card until I say "Begin." OK! Begin!

5. Work on any card will be finished when:

   a) the child has placed all of the figures on the card and seems to be finished, or

b) when 2 minutes have passed

6. Remove the cards and figures

7. Repeat same procedure for cards #2 - 4.

Appendix B

Maternal Teaching Style Instrument

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Category Definitions and Unitization

Rules I. Verbal Responses

a) Cue Label (CL) will be scored whenever the mother accurately uses a word or words to describe a figure on the card. For example, the mother would receive credit for saying "red" and/or for saying "triangle" when describing a red triangle to the child, but would receive no credit for a "that thing" response. Unit: See score sheet.

b) Direction (D) will be scored whenever the mother verbally instructs the child to do something with the test figures or cards. Unit: A direction is comprised of two elements: (1) to get the child to pick up the figure ("Pick up the blue square") and (2) to get the child to place the figure on the card "Put it in the upper right hand corner"). A "D" score is given when either one or both of these elements are given by the mother, but if a mother repeats an element, for example, "Pick it up", "Pick it up", etc., she is given a score for each repetition.

c) Positive Feedback (P+) will be scored whenever the mother responds favorably with words to the accuracy of what the child is doing or has done. Unit: A sentence. For example, either "Good" or "That is good" are each scored P+.

d) Negative Feedback (P-) will be scored whenever the mother responds unfavorably and critically with words to the accuracy of what the child is doing or has done. Unit: Same as c.

e) Question (Q) will be scored whenever the mother asks the child a question. Unit: Same as c.

f) Information (I) will be scored whenever the mother uses words to enrich or add to the child's test experience. What the mother says must be related to the test and must provide information to the child but should not be related to the child's actual test performance. For example, "this is a matching game", or "this is a red triangle", would be information responses. Unit: Same as c.

Appendix C

Tables

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Table A

Summary of Lindquist Type I Analysis of Variance Between Stanford Binet Pretest and Posttest Scores of Home Visitor Treatment Groups

Source	df	MS	F	p
Between	38	328.60		
Groups	2	203.94	0.608	ns
Error (G)	36	335.53		
Within	39	65.04		
Trials	1	15.71	0.226	ns
G X T	2	7.52	0.108	ns
Error (T)	36	69.60		
Total	77	195.11		

Table B

Summary of Analysis of Variance Between Stanford Binet Posttest Scores of Home Visitor Treatment Groups and Comparison Group

Source	df	MS	F	p
Between Groups	3	297.08	1.600	ns
Within Groups	45	174.58		
Total	48			

Table C

Summary of Lindquist Type I Analysis of Variance Between Peabody Picture Vocabulary Test Pretest and Posttest Scores of Home Visitor Treatment Groups

Source	df	MS	F	p
Between	38	555.04		
Groups	2	616.78	1.12	ns
Error (G)	36	551.61		
Within	39	248.51		
Trials	1	0.05	0.00	ns
G X T	2	436.00	1.78	ns
Error (T)	36	245.00		
Total	77	399.78		

Table D

Summary of Lindquist Type I Analysis of Variance Between Positive Feedback Pretest and Posttest Scores on Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	12.17		
Groups	1	7.13	.57	ns
Error (G)	20	12.42		
Within	22	6.68		
Trials	1	1.45	.20	ns
G X T	1	.04	.00	ns
Error (T)	20	7.28		
Total	43	9.36		

Table E

Summary of Lindquist Type I Analysis of Variance Between Question Pretest and Posttest Scores on Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	23.19		
Groups	1	.68	.03	ns
Error (G)	20	24.31		
Within	22	20.25		
Trials	1	27.84	1.35	ns
G X T	1	4.38	.21	ns
Error (T)	20	20.66		
Total	43	21.68		

Table F

Summary of Lindquist Type I Analysis of Variance Between Information Pretest and Posttest Scores on Maternal Teaching Style Instrument for MIT I and MIT II

Source	df	MS	F	p
Between	21	.67		
Groups	1	.09	.13	ns
Error (G)	20			
Within	22			
Trials	1	1.45	2.15	ns
G X T	1	.04	.05	ns
Error (T)	20	.68		
Total	43	.67		